

### SEQUENCE LISTING

110> Guerin-Marchand, Claudine Druilhe, Pierre

- <120> Peptide Sequences Specific for the Hepatic Stages of P. Falciparum Bearing Epitopes Capable of Stimulating the T Lymphocytes
- <130> 010830-118
- <140> US 09/900,963
- <141> 2001-07-10
- <150> US 08/098,327
- <151> 1993-11-24
- <150> PCT/FR92/00104
- <151> 1992-02-05
- <150> FR 91 01286
- <151> 1991-02-05
- <160> 47
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Xaa

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Xaa

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Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile
                                              60
Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val Glu
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Leu Tyr Gly Arg Leu Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn
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                            40
Glu Arg Gly Tyr Tyr Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn
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Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr
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                                        75
Asn Arg Glu Ser Ile Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His
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Lys Gly His Leu Glu Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln
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Lys Glu Asp Lys Ser
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Phe Asn Ser Leu Val Lys Ser Val Gln Gln Gln Gln His Asn Val
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Glu Glu Lys Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser Val
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                                            60
Glu Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser Val
                    70
                                        75
Ala Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser Ile
                                    90
Asp Ser Ser Ile Glu Glu Asn Val Ala Pro Thr Val Glu Glu Ile Val
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Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Lys Cys
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Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val
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Phe Asn Ser Leu Val Lys Ser Val Gln Gln Gln Gln His Asn
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Val Lys Glu Asn Ile Leu Glu Glu Ser Gln
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Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
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Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
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Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
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Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg Lys Lys Glu His
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Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro Ala
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270
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Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val
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ctaaagaaaa gttgcaagaa caacaaagcg atttagaaca agagagacgt gctaaagaaa 240
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aqtqttcaac aaqaacaaca acacaatqtt qaaqaaaaag ttgaagaaag tgtagaagaa 180
aatgacgaag aaagtgtaga agaaaatgta gaagaaaatg tagaagaaaa tgacgacgga 240
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agtattgaag aaaatgtagc tccaactgtt gaagaaatcg tagctccaac tgttgaagaa 360
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  aaaataatga aaataataaa tttttcgata aggataaaga gttaacgatg tctaatgtaa 300
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  ttg ata ttt cat ata aat gga aag ata ata aag aat tct gaa aaa gat
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tca Ser 65	tat Tyr	gag Glu	aaa Lys	act Thr	aaa Lys 70	aat Asn	aat Asn	gaa Glu	aat Asn	aat Asn 75	aaa Lys	ttt Phe	ttc Phe	gat Asp	aag Lys 80	240
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caa Gln	gaa Glu	caa Gln 195	caa Gln	agc Ser	gat Asp	tta Leu	gaa Glu 200	caa Gln	gag Glu	aga Arg	cgt Arg	gct Ala 205	aaa Lys	gaa Glu	aag Lys	624
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aag Lys 225	ttg Leu	caa Gln	gaa Glu	caa Gln	caa Gln 230	agc Ser	gat Asp	tta Leu	gaa Glu	caa Gln 235	gag Glu	aga Arg	cgt Arg	gct Ala	aaa Lys 240	720
gaa Glu	aag Lys	ttg Leu	caa Gln	gaa Glu 245	caa Gln	caa Gln	agc Ser	gat Asp	tta Leu 250	gaa Glu	caa Gln	gag Glu	aga Arg	cgt Arg 255	gct Ala	768

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Lys Glu Lys Leu Gln Glu Gln Ser Asp Leu Glu Gln Glu Arg Leu
gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gat aga
                                                                  864
Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
                            280
                                                                  912
ctt gct aaa gaa aag ttg caa gaa caa agc gat tta gaa caa gag
Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
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Glu Ile Ile Lys Ser Asn Leu Arg Ser Gly Ser Ser Asn Ser Arg Asn
                            40
Arg Ile Asn Glu Glu Asn His Glu Lys Lys His Val Leu Ser His Asn
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Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn Asn Lys Phe Phe Asp Lys
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Asp Lys Glu Leu Thr Met Ser Asn Val Lys Asn Val Ser Gln Thr Asn
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                85
Phe Lys Ser Leu Leu Arg Asn Leu Gly Val Ser Glu Asn Ile Phe Leu
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            100
Lys Glu Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile Glu His Ile Ile
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                                                125
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Asn Asp Asp Asp Lys Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn
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                                            140
Arg Gln Glu Asp Leu Glu Glu Lys Ala Ala Lys Glu Lys Leu Gln Gly
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                    150
Gln Gln Ser Asp Ser Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln
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                165
Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu
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                                185
Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
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                            200
Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu
                                            220
                        215
Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
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Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
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ttagaacaag agagacttgc taagaaaagt tgcaagaaca acaaagcgat ctagaacaag 180
agagacqtgc taaagaaaag ttgcaagaac aacaaagcga tttagaacaa gagagacgtg 240
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cqatttaqaa caaqaqaqac ttqctaaaqa aaagttqcaa gaacaacaaa gcgatttaga 480
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acqtqctaaq aaaagttqca agaacaacaa agcqatttag aacaagagag acqtqctaaa 600
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                                                                    96
Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
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                                  25
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                                                                    144
Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
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                             40
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Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
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aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt
                                                                    240
Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
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gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga
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Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
                                                          95
ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag
                                                                    336
Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
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Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
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gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa
Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu
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                        135
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caa gag aga ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta
Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu
                    150
145
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tta Leu	gaa Glu	caa Gln	gag Glu 180	aga Arg	cgt Arg	gct Ala	aaa Lys	gaa Glu 185	aag Lys	ttg Leu	caa Gln	gaa Glu	caa Gln 190	caa Gln	agc Ser	576
gat Asp	tta Leu	gaa Glu 195	caa Gln	gag Glu	aga Arg	cgt Arg	gct Ala 200	aaa Lys	gaa Glu	aag Lys	ttg Leu	caa Gln 205	gag Glu	cag Gln	caa Gln	624
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gaa Glu	ata Ile	cca Pro	gct Ala	ata Ile 245	gaa Glu	ctt Leu	cca Pro	tca Ser	gaa Glu 250	aat Asn	gaa Glu	cgt Arg	gga Gly	tat Tyr 255	tat Tyr	768
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aca Thr	aca Thr 290	aat Asn	gtt Val	gaa Glu	gga Gly	cga Arg 295	agg Arg	gat Asp	ata Ile	cat His	aaa Lys 300	gga Gly	cat His	ctt Leu	gaa Glu	912
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aat Asn	gat Asp	ttt Phe	caa Gln 340	ata Ile	agt Ser	aag Lys	tat Tyr	gag Glu 345	gat Asp	gaa Glu	ata Ile	agt Ser	gct Ala 350	gaa Glu	tat Tyr	1056
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gga Gly 385	att Ile	tat Tyr	aaa Lys	gaa Glu	cta Leu 390	gaa Glu	gat Asp	ttg Leu	ata Ile	gag Glu 395	aaa Lys	aat Asn	gaa Glu	aat Asn	tta Leu 400	1200

gat gat tta												
Asp Asp Let	gat gaa Asp Glu 405	Gly Il	a gaa e Glu	aaa Lys	tca Ser 410	tca Ser	gaa Glu	gaa Glu	tta Leu	tct Ser 415	gaa Glu	1248
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ata tat Ile Tyr									•			1494
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Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser
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Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Gln Gln
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Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg
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Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu
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                                     235
Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr
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Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg
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Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile
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Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu
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Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
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Asp Asp Ser Leu Ile Asp Glu Glu Asp Asp Glu Asp Leu Asp Glu
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Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
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aag tta caa gag cag caa agc gat tta gaa caa gag aga ctt gct aaa Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys 35 40 45	144											
gaa aag ttg caa gaa caa caa agc gat cta gaa caa gag aga cgt gct Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala 50 55 60	192											
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gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg 85 90 95	288											
ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu 100 105 110	336											
aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln 115 120 125	384											
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145	150	155	160
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gat tta gaa caa gag Asp Leu Glu Gln Glu 195	aga cgt gct aaa c Arg Arg Ala Lys c 200	gaa aag ttg caa gag Glu Lys Leu Gln Glu 205	cag caa 624 Gln Gln
aga gat tta gaa caa Arg Asp Leu Glu Gln 210	agg aag gct gat a Arg Lys Ala Asp T 215	acg aaa aaa aat tta Thr Lys Lys Asn Leu 220	gaa aga 672 Glu Arg
aaa aag gaa cat gga Lys Lys Glu His Gly 225	gat ata tta gca g Asp Ile Leu Ala G 230	gag gat tta tat ggt Glu Asp Leu Tyr Gly 235	cgt tta 720 Arg Leu 240
	Glu Leu Pro Ser G	gaa aat gaa cgt gga Glu Asn Glu Arg Gly 250	
		gac aac aga ggg aat Asp Asn Arg Gly Asn 270	
gat tcc aag gaa atg Asp Ser Lys Glu Met 275	tct ata ata gaa a Ser Ile Ile Glu I 280	aaa aca aat aga gaa Lys Thr Asn Arg Glu 285	tct att 864 Ser Ile
		ata cat aaa gga cat Ile His Lys Gly His 300	
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gct gac ata caa aat Ala Asp Ile Gln Asn 325	His Thr Leu Glu T	aca gta aat att tct Thr Val Asn Ile Ser 330	gat gtt 1008 Asp Val 335
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gac gat tca tta ata Asp Asp Ser Leu Ile 355	gat gaa gaa gaa g Asp Glu Glu Glu A 360	gat gat gaa gac tta Asp Asp Glu Asp Leu 365	gac gaa 1104 Asp Glu
ttt aag cct att gtg Phe Lys Pro Ile Val 370	caa tat gac aat t Gln Tyr Asp Asn I 375	ttc caa gat gaa gaa Phe Gln Asp Glu Glu 380	aac ata 1152 Asn Ile
gga att tat aaa gaa	cta gaa gat ttg a	ata gag aaa aat gaa	aat tta 1200

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385	Lys Glu	Leu 0 390	Glu A	Asp Let	Ile	Glu 395	Lys	Asn	Glu	Asn	Leu 400	
gat gat tta Asp Asp Leu												1248
gaa aaa ata Glu Lys Ile												1296
ttt aaa cca Phe Lys Pro 435			Ser L									1344
aaa aat gat Lys Asn Asp 450	aag cag Lys Gln	Val A	aat a Asn L 455	ag gaa ys Glu	aag Lys	gaa Glu	aaa Lys 460	ttc Phe	ata Ile	aaa Lys	tca Ser	1392
ttg ttt cat Leu Phe His 465												1440
gag tta tct Glu Leu Ser										aag Lys	_	1488
ata tat Ile Tyr												1494
•												
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Gln	Glu	Arq	Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu
145					150					155					160
				165					170					Ser 175	
Leu	Glu	Gln	Glu 180	Arg	Arg	Ala	Lys	Glu 185	Lys	Leu	Gln	Glu	Gln 190	Gln	Ser
Asp	Leu	Glu 195	Gln	Glu	Arg	Arg	Ala 200	Lys	Glu	Lys	Leu	Gln 205	Glu	Gln	Gln
Arg	Asp 210	Leu	Glu	Gln	Arg	Lys 215	Ala	Asp	Thr	Lys	Lys 220	Asn	Leu	Glu	Arg
Lys 225	Lys	Glu	His	Gly	Asp 230	Ile	Leu	Ala	Glu	Asp 235	Leu	Tyr	Gly	Arg	Leu 240
Glu	Ile	Pro	Ala	Ile 245	Glu	Leu	Pro	Ser	Glu 250	Asn	Glu	Arg	Gly	Tyr 255	Tyr
Ile	Pro	His	Gln 260	Ser	Ser	Leu	Pro	Gln 265	Asp	Asn	Arg	Gly	Asn 270	Ser	Arg
Asp	Ser	Lys 275	Glu	Met	Ser	Ile	Ile 280	Glu	Lys	Thr	Asn	Arg 285	Glu	Ser	Ile
Thr	Thr 290	Asn	Val	Glu	Gly	Arg 295	Arg	Asp	Ile	His	Lys 300	Gly	His	Leu	Glu
Glu 305	Lys	Lys	Asp	Gly	Ser 310	Ile	Lys	Pro	Glu	Gln 315	Lys	Glu	Asp	Lys	Ser 320
	Asp	Ile	Gln	Asn 325	His	Thr	Leu	Glu	Thr 330	Val	Asn	Ile	Ser	Asp 335	Val
Asn	Asp	Phe	Gln 340	Ile	Ser	Lys	Tyr	Glu 345	Asp	Glu	Ile	Ser	Ala 350	Glu	Tyr
Asp	Asp	Ser 355	Leu	Ile	Asp	Glu	Glu 360	Glu	Asp	Asp	Glu	Asp 365	Leu	Asp	Glu
Phe	Lys 370	Pro	Ile	Val	Gln	Tyr 375	Asp	Asn	Phe	Gln	Asp 380	Glu	Glu	Asn	Ile
Gly 385	Ile	Tyr	Lys	Glu	Leu 390	Glu	Asp	Leu	Ile	Glu 395	Lys	Asn	Glu	Asn	Leu 400
Asp	Asp	Leu	Asp	Glu 405	Gly	Ile	Glu	Lys	Ser 410	Ser	Glu	Glu	Leu	Ser 415	Glu
Glu	Lys	Ile	Lys 420	Lys	Gly	Lys	Lys	Tyr 425	Glu	Lys	Thr	Lys	Asp 430	Asn	Asn
Phe	Lys	Pro 435	Asn	Asp	Lys	Ser	Leu 440	Tyr	Asp	Glu	His	Ile 445	Lys	Lys	Tyr
Lys	Asn 450	Asp	Lys	Gln	Val	Asn 455	Lys	Glu	Lys	Glu	Lys 460	Phe	Ile	Lys	Ser
Leu 465	Phe	His	Ile	Phe	Asp 470	Gly	Asp	Asn	Glu	Ile 475	Leu	Gln	Ile	Val	Asp 480
Glu	Leu	Ser	Glu	Asp 485	Ile	Thr	Lys	Tyr	Phe 490	Met	Lys	Leu	Lys	Val 495	Ile
Tyr															

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